CLAIMS

What is claimed is:

1. A channel cutting tool comprising:

an arbor rotatable about a longitudinal axis;

at least a cutting blade fixedly mounted to the arbor and adapted to rotate with the arbor about the longitudinal axis; and

a depth limiting washer disposed adjacent the cutting blade and being concentric with the cutting blade, the depth limiting washer adapted to be freely rotatable relative to the arbor;

wherein a radius of the depth limiting washer is smaller than a radius of the cutting blade.

2. The channel cutting tool of claim 1, further comprising a sensor adapted to sense a force exerted on a perimeter surface of the depth limiting washer.

3. The channel cutting tool of claim 1, wherein the cutting blade is a circular blade having a cutting edge.

4. The channel cutting tool of claim 1, further comprising an inner washer fixedly mounted to the arbor adjacent the cutting blade and being concentric with the cutting blade, the depth limiting washer being mounted concentrically over the inner washer and being freely rotatable relative to the inner washer.

5. The channel cutting tool of claim 4, further comprising a lubricant disposed between the depth limiting washer and the inner washer.

6. The channel cutting tool of claim 4, further comprising a ball bearing disposed between the depth limiting washer and the inner washer.

7. A tool for cutting channels in a liner of a rocket engine combustion chamber or a rocket engine nozzle, the cutting tool comprising:

an arbor rotatable about a longitudinal axis;

a pair of cutting blades fixedly mounted to the arbor and adapted to rotate with the arbor about the longitudinal axis;

an inner washer fixedly mounted to the arbor between the cutting blades and concentric with the cutting blades; and

an outer washer rotatably mounted to the inner washer between the cutting blades and being concentric with the inner washer, the outer washer having a smaller radius than a radius of the cutting blades;

wherein a difference between a radius of the cutting blades and a radius of the outer washer substantially defines a depth limit of the channels cut in the liner by the pair of cutting blades.

8. The tool of claim 7, further comprising a lubricant disposed between the outer washer and the inner washer.

9. The tool of claim 7, further comprising a ball bearing disposed between the outer washer and the inner washer.

10. The tool of claim 7, wherein a perimeter surface of the outer washer is adapted to contact a land portion of the liner disposed between the channels at the depth limit.

11. The tool of claim 10, further comprising a sensor adapted to sense a force of the contact between the perimeter surface of the outer washer and the land portion of the liner.

12. The tool of claim 7, wherein each cutting blade is a circular blade having a cutting edge.

13. A channel cutting tool comprising:

an arbor rotatable about a longitudinal axis;

at least a cutting blade fixedly mounted to the arbor and adapted to rotate with the arbor about the longitudinal axis; and

means for limiting a cutting depth of the cutting blade.

14. The channel cutting tool of claim 13, wherein each cutting blade is a circular blade having a cutting edge.

15. A method of cutting channels in a liner of a rocket engine combustion chamber or a rocket engine nozzle, the method comprising:

cutting the liner along a channel direction at a cutting depth with a cutting tool, the cutting tool comprising a pair of cutting blades, the rotating of the cutting tool causing the rotating of the cutting blades, and the cutting tool comprising at least one washer disposed between the cutting blades and being concentric with the cutting blades, the washer adapted to be freely rotatable relative to the cutting blades, a radius of the washer being smaller than a radius of the cutting blades; and

limiting the cutting depth by a perimeter surface of the washer contacting a portion of the liner between the channels cut by the pair of cutting blades.

16. The method of claim 15, the limiting comprising the perimeter surface of the washer rolling on the portion of the liner between the channels upon contact with the portion of the liner between the channels when the cutting tool is moved in the channel cutting direction.

17. The method of claim 15, further comprising sensing a force of the contact between the perimeter surface of the washer and the portion of the liner between the channels with a sensor.

18. The method of claim 17, further comprising stopping the cutting when the force sensed by the sensor exceeds a force level.

19. A method of cutting channels in a part, the method comprising:

cutting a pair of adjacent channels in the part with a pair of rotatably coupled cutting blades; and

limiting a depth of cut of the pair of adjacent channels by an outer surface of at least one washer freely rolling on an uncut portion of the part between the pair of adjacent channels when the cutting blades are moved in a channel cutting direction, the at least one washer having a smaller radius than a radius of each of the cutting blades, and the at least one washer being disposed between the cutting blades and being concentric therewith.

20. A rocket engine combustion chamber and nozzle comprising:

a rocket engine nozzle jacket; and

a rocket engine nozzle liner attached to the rocket engine nozzle jacket, the rocket engine nozzle liner including a plurality of channels, each channel cut by a

cutting tool having at least a cutting blade and a washer adjacent to and concentric with the cutting blade, the washer being freely rotatable relative to the cutting blade and adapted to contact the liner to limit a cutting depth of the cutting blade.

21. The rocket engine combustion chamber and nozzle of claim 20, further comprising a manifold to distribute a coolant in the plurality of channels.